CLAIMS

1. Transmission system (1), comprising:
a drive wheel (2), a driven wheel (3), and a coupling chain (4) having a first chain half (4C) and a second chain half (4D);
a tension difference measuring device (6) for providing a measurement signal which is representative for the torque transmitted by the coupling chain (4);
said measuring device (6) comprising a transverse force sensor (10; 2; 3) arranged within the span of the coupling chain (4), provided with measuring means (20, 30; 130), for providing a measurement signal (S_M) which is a measure for the component (F_V), directed substantially perpendicular to the plane (L) defined by the rotation axes of the drive wheel (2) and the driven wheel (3), of the resultant (F_{DR}) of the transverse forces (F_{DC}, F_{DD}) exerted to the sensor (10; 2; 3) by the chain parts (4C, 4D; 4A; 4B).

2. Transmission system according to claim 1, wherein the transverse force sensor (10) is arranged between the drive wheel (2) and the driven wheel (3), and has a first contact face (11) touching the first chain half (4C) and a second contact face (12) touching the second chain half (4D).

3. Transmission system according to claim 2, wherein the transverse force sensor (10) has a circular outline.

4. Transmission system according to claim 3, wherein the transverse force sensor (10) is rotatably mounted.

5. Transmission system according to claim 4, wherein a force sensor is mounted on an axle of the rotatably mounted transverse force sensor (10), said force sensor preferably comprising a sensor sensitive to bending of the said axle.

6. Transmission system according to claim 4, wherein a force sensor is mounted in a bearing of the rotatably mounted

transverse force sensor (10), said force sensor preferably comprising a sensor sensitive to the resulting force exerted on the transverse force sensor (10).

7. Transmission system according to any of the claims 3-6, wherein the centre point of the transverse force sensor (10) is substantially located in the plane (L) defined by the rotation axes of the drive wheel (2) and the driven wheel (3), and wherein a rotation axis of the transverse force sensor (10) is directed substantially parallel to the rotation axes of the drive wheel (2) and the driven wheel (3).

8. Transmission system according to claim 2, wherein the two contact faces (11, 12) are convex with a varying curvature radius.

9. Transmission system according to claim 2, wherein the two contact faces (11, 12) are convex with a curvature radius which is larger than half the distance between both contact faces.

10. Transmission system according to any of the claims 2-7, wherein said measuring means are adapted for measuring a displacement of the transverse force sensor (10).

11. Transmission system according to claim 10, wherein said measuring means comprise a supporting arm (20) for the transverse force sensor (10), as well as a sensor (30) for measuring a deformation of the supporting arm (20).

12. Transmission system according to claim 11, wherein said supporting arm (20) is directed substantially perpendicular with respect to the plane (L) defined by the rotation axes of the drive wheel (2) and the driven wheel (3), and wherein said sensor (30) is adapted for measuring a change in length of the supporting arm (20).

13. Transmission system according to claim 11, wherein said supporting arm (20) is directed substantially perpendicular

with respect to the plane defined by the coupling chain (4), and wherein said sensor (30) is adapted for measuring a bending of the supporting arm (20).

14. Transmission system according to claim 11, wherein said supporting arm (20) is directed substantially parallel to the plane (L) defined by the rotation axes of the drive wheel (2) and the driven wheel (3) and is directed substantially parallel to the plane defined by the coupling chain (4), and wherein said sensor (30) is adapted for measuring a bending of the supporting arm (20).

15. Transmission system according to claim 14, wherein said supporting arm (20) is attached to a wheel axle of the drive wheel (2) or of the driven wheel (3).

16. Transmission system according to any of the claims 10-15, wherein the measuring sensor (30) comprises one or more strain gauges.

17. Transmission system according to claim 2, wherein at least the contact faces (11, 12) of the force sensor (10) are manufactured of a sound production counteracting material, wherein the whole force sensor (10) is preferably manufactured of a sound production counteracting material, said material comprising for instance a synthetic material.

18. Transmission system according to claim 1, wherein the transverse force sensor is one of the wheels (2, 3), and wherein the measuring sensor (130) is adapted for measuring the force exerted to the wheel concerned in a direction substantially perpendicular to the plane (L) defined by the rotation axes of the drive wheel (2) and the driven wheel (3).

19. Vehicle, comprising a transmission system (1) according to any of the claims 1-18, which vehicle can be a vehicle driven by human force, particularly a bicycle.

20. Training device, comprising a transmission system (1) according to any of the claims 1-18, which training device can be a bicycle training device, for instance a home trainer or a spinning bike.

21. Method for measuring a drive force being transmitted by a transmission system (1), comprising a drive wheel (2), a driven wheel (3), and a coupling chain (4) having a first chain half (4C) and a second chain half (4D);
said method comprising the steps of:
providing a transverse force sensor (10) having a first contact face (11) and a second contact face (12);
arranging the transverse force sensor (10) between the drive wheel and the driven wheel within the span of the chain (4), in such a way that the first contact face (11) is in force transmitting contact with the first chain half (4C) and that the second contact face (12) is in force transmitting contact with the second chain half (4D);
measuring the component (F_V), directed substantially perpendicular to the plane (L) defined by the rotation axes of the drive wheel (2) and the driven wheel (3), of the resultant (F_{DR}) of the transverse forces (F_{DC}, F_{DD}) exerted to the transverse force sensor (10) by the first chain half (4C) and the second chain half (4D).

22. Method according to claim 21, wherein said force component (F_V) is measured by measuring a displacement of the transverse force sensor (10) caused by said force component (F_V).

23. Method according to claim 22, wherein the transverse force sensor (10) is fixed with a supporting arm (20) with respect to the transmission system (1), and wherein said displacement is measured by measuring a deformation of the supporting arm (20) of the transverse force sensor (10) caused by said force component (F_V).

24. Method according to claim 22, wherein the transverse force sensor (10) is mounted on an axle, on which axle a force sensor is mounted, and wherein said displacement is measured

by measuring a deformation of said axle of the transverse force sensor (10) caused by said force component (F_V).

25. Method according to claim 22, wherein the transverse force sensor (10) is rotatably mounted in a bearing, wherein a force sensor is mounted in the bearing of the transverse force sensor (10), and wherein said displacement is measured by measuring a force on the bearing of the transverse force sensor (10) caused by said force component (F_V).

26. Tension difference measuring device (6) for measuring the drive force being transmitted by a transmission system (1), comprising a drive wheel (2), a driven wheel (3), and a coupling chain (4) having a first chain half (4C) and a second chain half (4D);
said measuring system comprising:
a transverse force sensor (10) having a first contact face (11) and a second contact face (12), suitable for placing between the drive wheel and the driven wheel within the span of the coupling chain (4), in such a way that the first contact face (11) is in force transmitting contact with the first chain half (4C) and that the second contact face (12) is in force transmitting contact with the second chain half (4D);
said measuring system being suitable for performing the method according to any of the claims 21-25.

27. Measuring system according to claim 26, furthermore comprising a supporting arm (20) carrying the transverse force sensor (10), which arm is suitable for fixing the transverse force sensor (10) with respect to the transmission system (1).

28. Measuring system according to claim 27, wherein the supporting arm (20) is provided with a deformation sensor (30), for instance one or more strain gauges.

29. Measuring system according to claim 27 or 28, wherein the transverse force sensor (10) has a circular outline and is rotatably attached to the supporting arm (20).

30. Measuring system according to any of the claims 27-29, wherein the supporting arm (20) has an elongated hole (204) for mounting the transverse force sensor (10), said elongated hole (204) having a longitudinal direction which substantially coincides with the longitudinal direction of the supporting arm (20).

31. Measuring system according to any of the claims 27-30, wherein the supporting arm (20) has a cut-away (209) which divides the arm in a primary arm part (210) and a secondary arm part (220) which supports the transverse force sensor (10);
wherein the secondary arm part (220) is connected to the primary arm part (210) by at least two bridge parts (230, 240);
wherein a deformation sensor (250) is mounted on a side face (234) of at least one bridge part (230), the sensor preferably comprising two strain gauges (251, 252).